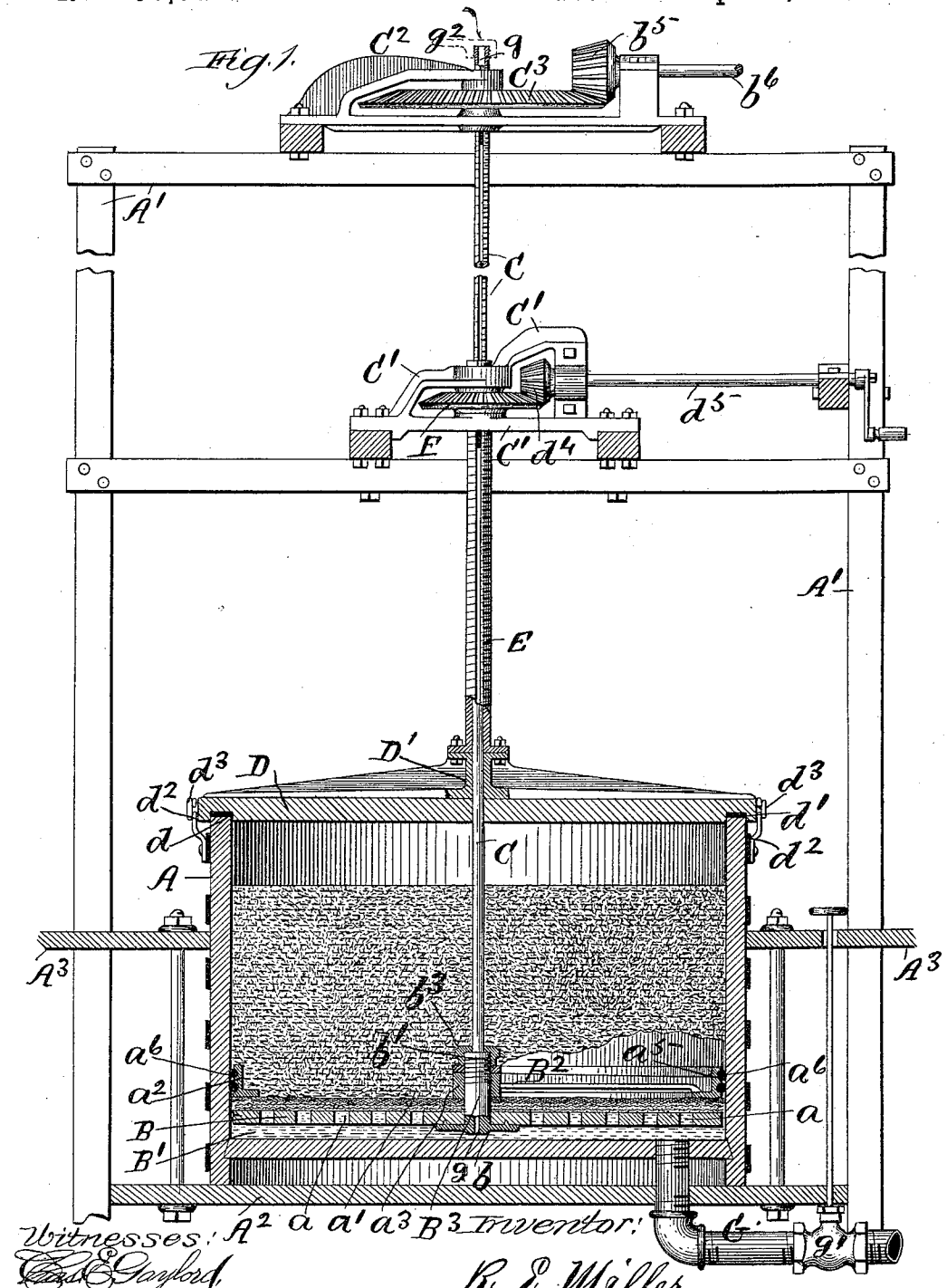
(No Model.) 3 Sheets—Sheet 1.

R. E. MILLER.

FILTERING APPARATUS.

No. 436,044. Patented Sept. 9, 1890.

Fig. 1.



Witnesses:
Chas. E. Gaylord
L. M. Freeman.

Inventor:
R. E. Miller.
By L. B. Copeland & Co
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 2.

R. E. MILLER.

FILTERING APPARATUS.

No. 436,044. Patented Sept. 9, 1890.

Fig. 2.

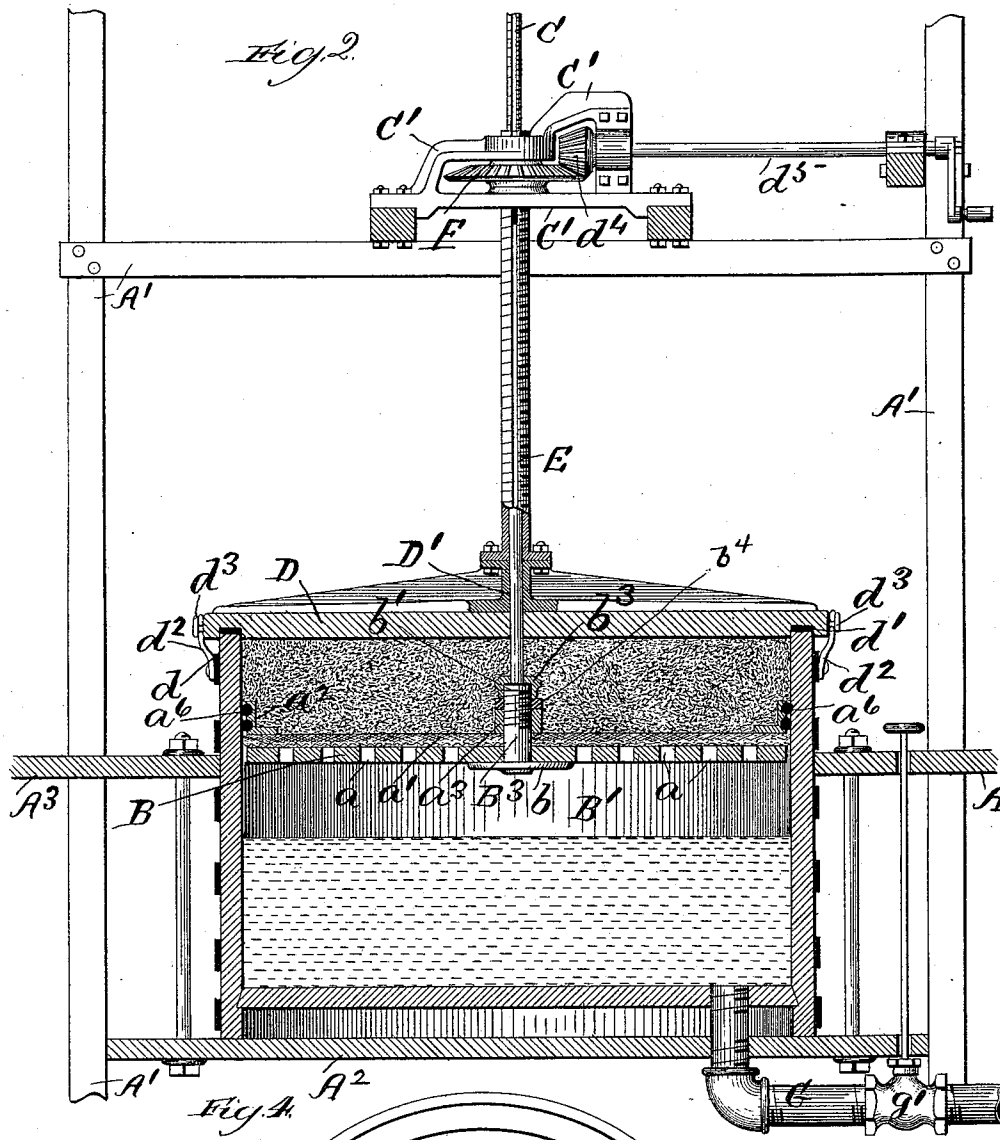
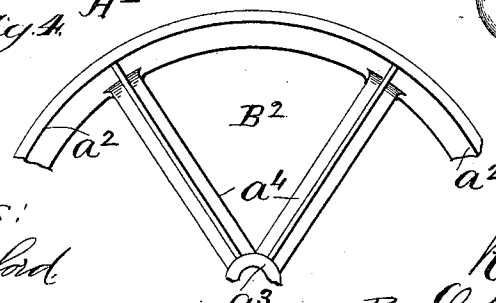


Fig. 4.



Witnesses:
Chas. E. Gaylord
L. M. Freeman

Inventor:
R. E. Miller.
By L. B. Coupland & Co
Att'ys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

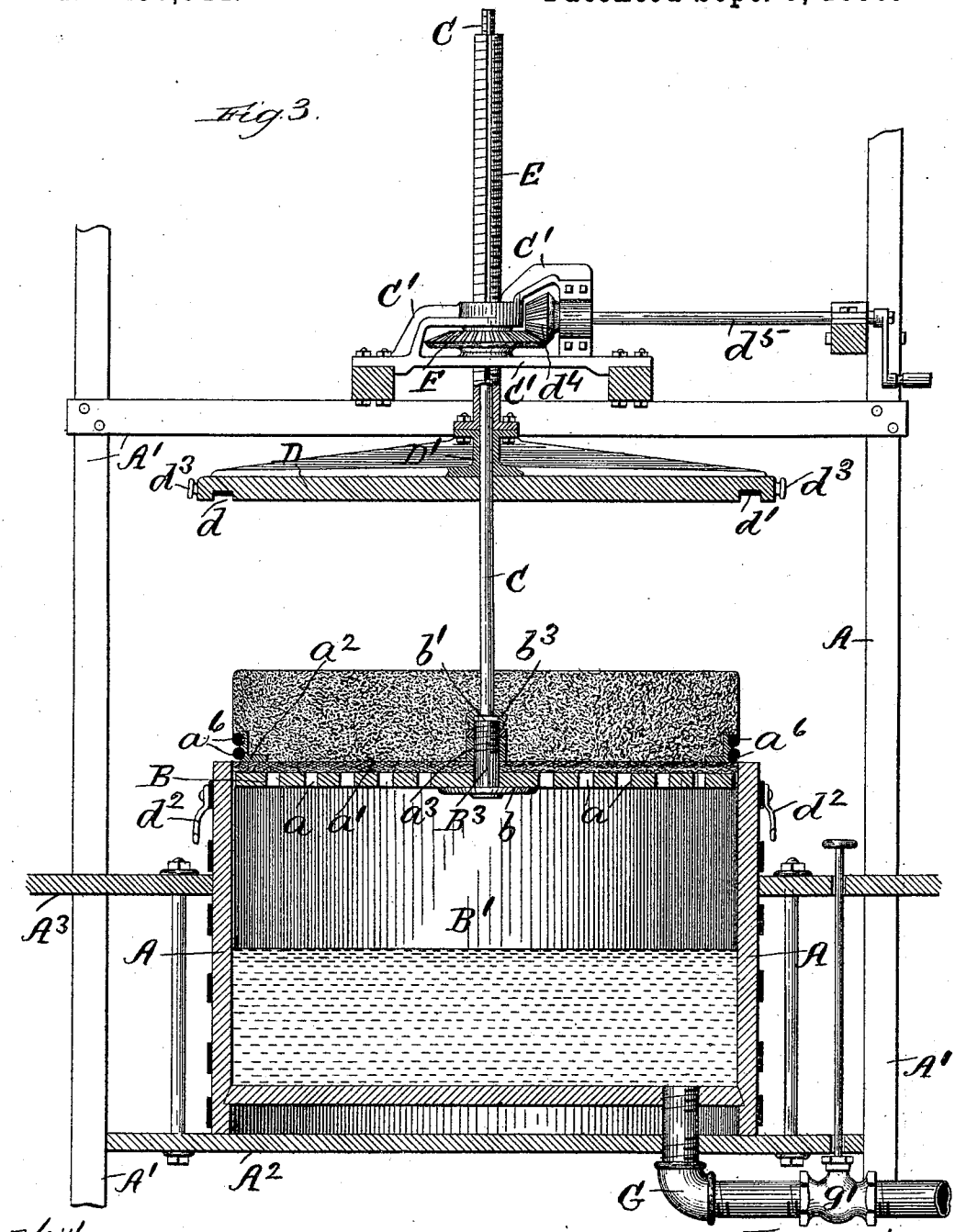
(No Model.) 3 Sheets—Sheet 3.

R. E. MILLER.

FILTERING APPARATUS.

No. 436,044. Patented Sept. 9, 1890.

Fig. 3.



Witnesses:
Chas. E. Gaylord.
L. W. Freeman.

Inventor:
R. E. Miller.
By L. B. Coupland & Co
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ROBERT E. MILLER, OF CHICAGO, ILLINOIS.

FILTERING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 436,044, dated September 9, 1890.

Application filed January 22, 1890. Serial No. 337,687. (No model.)

To all whom it may concern:

Be it known that I, ROBERT E. MILLER, of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Filtering Apparatus, of which the following is a full, clear, and exact description, that will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to improvements in that class of filters more especially used in separating liquids from solid matter, but may also be used in purifying water and other liquids, the same consisting of certain novel features in the construction, arrangement, and operation of the several parts, as will be hereinafter set forth.

Figure 1 is a part elevation and part section of an apparatus embodying my improved features and showing the filtering-piston in its lowest position; Fig. 2, a similar view, the upper part illustrated in Fig. 1 being broken away and the filtering-piston shown in an intermediate position with reference to the top and bottom of the inclosing-receptacle. Fig. 3 is a similar view from that illustrated in Fig. 2, with the difference that the filtering-piston is shown in its highest position, the cover of the receptacle being raised up out of the way to permit of the removal of the solid or refuse matter; and Fig. 4, a broken-away plan of a spider packing-ring placed on top of the filtering-piston.

Referring to the drawings, A represents the filtering-receptacle of a cylindrical form, which may be of any desired capacity. This receptacle is of a uniform diameter, the inclosing sides being perpendicular.

A′ indicates the different parts of the supporting-frame; A^2, the lower platform or floor, upon which the receptacle A is set, and A^3 the upper or foot platform for the convenience of the workmen. The piston filtering-diaphragm B is made to closely fit the interior of the inclosing-receptacle and has a vertical movement therein. This piston is provided with a number of perforations a, and the upper side is covered with one or more layers of wire-cloth a', or other suitable straining and filtering material, to prevent any solid matter from passing into and clogging the passages a, through which the liquid passes into the chamber B′ below the piston. The layers of wire-cloth and other filtering substances it may be necessary to use are retained in place with reference to the upper side of the piston by the spider packing-ring B^2, (see Fig. 4,) which consists of the rim a^2, the central hub a^3, and a number of radial arms a^4, connecting the hub and rim, which is of a diameter corresponding to that of the piston. The rim is L-shaped in cross-section, and is provided on its periphery with one or more annular grooves a^5 to receive the packing-bands a^6, which bear against the inclosing sides of the receptacle and forms an air-tight joint. The stub-shaft B^3 passes vertically through the center of the piston, and is provided on the lower end with the attaching flange or plate b, rigidly secured to the under side of the piston. The hub of the packing-ring is mounted on this short stub-shaft, the end projecting above the hub being threaded.

The lower end of the vertical tubular shaft C is provided with the flanged head b' and rests loosely on the upper end of the stub-shaft B^3, and is retained in position relative thereto by means of the screw-cap b^3 engaging with the upper threaded end of the stub-shaft, the threaded clamping-nut b^4 being inserted between the hub of the packing-ring and the screw-cap. This arrangement provides for the convenient disconnection of the piston and vertical shaft C when necessary so to do either for the purpose of cleaning the apparatus or making repairs. The upper part of the shaft C is screw-threaded and passes up through the brackets C′ C^2, which are bolted to the frame-work and retain the shaft in proper position. The bevel gear-wheel C^3 is mounted upon and has a screw-threaded engagement with the upper end of the shaft C. The bevel-pinion b^5 is mounted on the horizontal shaft b^6 and engages with the upper side of the gear-wheel C^3. By rotating the driving-shaft b^6 a corresponding movement is imparted to the gear-wheel C^3 and the vertical shaft and piston raised or lowered as may be required in the process of working and in accordance with the direction in which the driving-shaft is rotated.

The filtering-receptacle is provided with the tight-fitting removable cover D, provided in the under side with the annular groove d, engaging with the top edge of the receptacle. A packing-gasket d' is inserted in the bottom of the groove d and forms an air-tight joint between the cover and receptacle. This cover is clamped in place by means of a number of hooks d^2, the lower ends of which are pivoted to the sides of the receptacle, while the upper hook ends engage with the headed locking-pins d^3, projecting from the periphery of the cover. The sleeve D′ is rigidly secured in the center of the cover, the vertical shaft C running through the same. The hollow shaft E is mounted upon and loosely incloses a portion of the shaft C. The lower flanged end of the hollow or tubular shaft E is bolted to the upper correspondingly-flanged end of the sleeve D′. The exterior surface of the hollow shaft E is screw-threaded, and the hub of the bevel gear-wheel F, mounted thereon and supported in place by the bracket C′, is also threaded. The pinion d^4, mounted on the driving or operating shaft d^5, engages with the gear-wheel F, whereby the hollow shaft may be run up or down on the shaft C for the purpose of raising or lowering the cover D. The chamber below the piston is vented through the passage g in the vertical shaft and the stub-shaft in the piston. The liquid filtered or separated from the solid or refuse matter is run off through the pipe G, provided with the stop-valve g'. The vent-passage may be closed by means of the removable cap g^2, placed on the upper end of the shaft C, as indicated by dotted lines in Fig. 1.

In operation the piston is run down to the lowest position (illustrated in Fig. 1) and the matter to be filtered deposited in the receptacle, as shown. The cover is then tightly secured in place and the process of filtration begun by imparting an upward movement to the piston, the liquid passing into the chamber or space below, the capacity of which increases as the piston ascends. The solid matter is carried up and compressed between the piston and cover, thus expressing all the liquid and forming the refuse or solid matter into a comparatively dry hard cake, as illustrated in Fig. 2. The cover is then detached and run up out of the way and the piston run up on a level with the top of the receptacle, as illustrated in Fig. 3, when the solid matter can be conveniently and quickly removed. The air-passage through the piston-shaft will ordinarily be closed in working, so that the vacuum formed below the piston will aid and facilitate the process.

When it is designed to use the apparatus for clarifying or purifying purposes, some suitable filtering material may be placed on top of the layers of wire-cloth.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a filtering apparatus, the combination of a receptacle, the movable perforated piston-diaphragm inserted therein, the layers of wire-cloth or other filtering material placed on top of said piston, and the packing-ring consisting of a rim L-shaped in cross-section, a central hub, and radial arms connecting the rim and hub, said ring being provided on its periphery with one or more annular grooves, and the packing band or bands inserted in said grooves, whereby an air-tight joint is formed between the ring and the inclosing sides of the receptacle above the piston, substantially as set forth.

2. In a filtering apparatus, the combination, with the filtering-diaphragm, of a packing-ring consisting of a rim L-shaped in cross-section and provided exteriorly with one or more grooves, a central hub, and radial arms connecting said rim and hub, and the packing inserted in the grooves of said rim, substantially as set forth.

3. In a filtering apparatus, the combination of the filtering-piston, the stub-shaft provided on its lower end with an attaching-flange and passing vertically through the center of said piston and having its upper projecting end screw-threaded, the packing-ring loosely mounted on said shaft, and the clamping-nut securing said ring with reference to the stub-shaft, substantially as set forth.

4. In a filtering apparatus, the combination of the inclosing-receptacle, the filtering-piston, the stub-shaft passing vertically through the center of said piston and provided on its lower end with a flange and having its upper end screw-threaded, the vertical shaft having its lower flanged end resting on the upper end of the stub-shaft, the screw-cap securing the joining ends of said shafts, the brackets supporting the upper threaded part of the vertical shaft, and means, substantially as described, for imparting a vertical movement to the filtering-piston, substantially as and for the purpose set forth.

5. In a filtering apparatus, the combination of the inclosing-receptacle, the movable piston inserted therein and forming an air-tight joint with the inclosing sides, the stub-shaft, and the vertical shaft connected thereto, both of said shafts being provided with an air-passage running longitudinally therethrough, whereby air may be admitted into or excluded from the chamber below the filtering-piston, substantially as and for the purpose set forth.

6. In a filtering apparatus, the combination of the filtering-receptacle, the filtering-piston having a vertical movement therein, the cover provided with an annular groove fitting over the top edge of said receptacle, the packing-gasket inserted in the bottom of said groove, the clamping-hooks securing the cover in a

closed position, and the shaft passing vertically through said cover, whereby the upward movement of said piston compresses the solid matter against the cover and expresses the liquid therefrom, substantially as set forth.

7. In a filtering apparatus, the combination of the filtering-receptacle, the piston-diaphragm, means, substantially as described, for imparting a vertical movement to said piston, the removable cover, the sleeve rigidly secured to the center thereof, the hollow shaft secured at its lower end to said sleeve and having its exterior surface screw-threaded, the bracket supporting the upper end of said shaft, the gear-wheel mounted upon and having a threaded engagement with said shaft, the pinion engaging with the gear-wheel, and the driving-shaft upon which the pinion is mounted, whereby said cover may be raised up out of the way and the piston further elevated to facilitate the removal of the solid or refuse matter after the liquid has been expressed therefrom, substantially as set forth.

ROBERT E. MILLER.

Witnesses:
L. M. FREEMAN,
J. B. DONALSON.